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10/698,008	10/30/2003	Yiqing Liang	1617880-0010	7403

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EXAMINER	
TORRES, JOSE	
ART UNIT	**PAPER NUMBER**
2112	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/698,008	LIANG ET AL.	
	Examiner	Art Unit	
	Jose M. Torres	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10/30/2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/04/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

- Figure 3: "305", "306", "307", "309", "319"

2. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the specification.

4. The disclosure is objected to because of the following informalities:

- Page 1: First sentence of the application should be -- This is a continuation-in-part of application Ser. No. 09/718,374, filed on November 24, 2000, which is issued on Jan. 13, 2004 as U.S. Pat. No. 6,678,413. --
- Page 6 line 9: "product" should be -- produce --
- Page 16 line 17: "anima's" should be -- animal's --
- Page 39 line 14: "715 720" should be -- 715, 720 --

Appropriate correction is required.

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- Claim 9 line 7: "refine contours of said animal image by smoothing."

Claim Objections

6. Claims 8-12, 14-19, 24, 26, 27, 32, and 36-38 are objected to because of the following informalities:

- Claims 8, 11, 12, 14-19, 32 and 36-38 should end with a period -- . --

- Claim 9 line 3: "apply a adaptive" should be -- apply an adaptive --
- Claim 10 lines 8-9: "Principal Component Analysis" should be -- principal component analysis --
- Claim 13 line 4: "segments of the said animal" should be -- segments of said animal --
- Claim 24 lines 2-6: the claim limitations enclosed in parenthesis should be rephrased without the use of parentheses. Parentheses should only be used in the body of the claim to enclose reference characters. See MPEP § 608.01(m).
- Claim 26 line 2: "Elevated Plus" should be -- elevated plus --
- Claim 27 line 2: "Object Recognition" should be -- object recognition --
- Claim 38 line 2: "from zone to another" should be -- from one zone to another --

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 23, 24, 34 and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 23, 24 and 40 contain the trademarks/trade names Water Maze in claim 23 line 2, Plexiglas and Radial in claim 24 lines 4 and 5 respectively, and VISIBLE in claim 40 line 3. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademarks/trade names are used to identify/describe acrylic glass (Plexiglas) maze, a maze comprising arms radiating from a center point (Radial) and easily viewed from the animal's eyes (VISIBLE) and, accordingly, the identification/description is indefinite.

Re claim 34: the phrase "for example" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d). Examiner suggests deleting the sentence, since claims should be written in one sentence form only.

Appropriate correction is required.

Double Patenting

9. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

10. Claims 1-7 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-7 of copending Application No. 10/698,044. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the present claimed invention obviously encompasses the claimed invention of Patent Application 10/698,044 and differ only in the terminology.

For instance, in claims 1-7 of the present claimed invention, the Applicant recites: "A video-based animal behavior analysis system, comprising: a computer configured to determine a position and shape of an animal from video images and characterize activity of said animal based on analysis of changes in said position and said shape over time" in claim 1, "a video camera and a video digitization unit coupled to said computer for capturing said video images and converting said video images from analog to digital format." in claim 2, "an animal identification, segregation, and tracking module receiving said video images." iIn claim 3, "a behavior identification module for

characterizing activity of said animal, said behavior identification module being coupled to said animal identification, segregation, and tracking module." in claim 4, "a standard animal behavior storage module that stores information about known behavior of a predetermined standard animal for comparing the activity of said animal, said standard animal behavior storage module being coupled to said behavior identification module." in claim 5, " said animal is a mouse." in claim 6 and "said animal is a rat." in claim 7.

Whereas, in claims 1-7 of '044 Patent Application, the Applicants claim: "A video-based animal behavior analysis system, comprising: a computer configured to determine a position and shape of an animal from video images and characterize activity of said animal based on analysis of changes in said position and said shape over time" in claim 1, "a video camera and a video digitization unit coupled to said computer for capturing said video images and converting said video images from analog to digital format." in claim 2, "an animal identification, segregation, and tracking module receiving said video images." in claim 3, "behavior identification module for characterizing activity of said animal, said behavior identification module being coupled to said animal identification, segregation, and tracking module." in claim 4, "a standard animal behavior storage module that stores information about known behavior of a predetermined standard animal for comparing the activity of said animal, said standard animal behavior storage module being coupled to said behavior identification module." in claim 5, "said animal is a mouse." in claim 6 and "said animal is a rat." in claim 7.

Accordingly, in respect to above discussions, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teachings of

claims 1-7 of '044 Patent Application as a general teachings for a video-based animal behavior analysis system as claimed by the present application. The instant claims obviously encompass the claimed invention of '044 Patent Application.

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 1-6 and 8-10 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 5-7, 11, 14, 19 and 22 of U.S. Patent No. 6,678,413.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the present claimed invention is a recitation of the '413 Patent, for example in claims 8 and 10 of the present claimed invention and claim 14 of the '413 Patent, the Applicants claim: "A method of determining and characterizing activity of an

animal using computer processing of video images, comprising the steps of: detecting an animal in said video images; tracking changes to said animal over a plurality of said video images; identifying and classifying said changes to said animal; and characterizing said activity of said animal based on comparison to pre-trained models or rules of such activity or based on calculation of behavioral parameters of behavioral processes and behavioral events." and "said step of identifying and classifying change to said animal includes using statistical shape information selected from the group consisting of: area of the animal; centroid position of the animal; bounding box and its aspect ratio of the animal; and a directional orientation of the animal relative to an axis as generated with a Principal Component Analysis.", whereas in '413 Patent the Applicants claim "A method of characterizing activity of an object using a computer comprising: detecting a foreground object of interest in video images; tracking said foreground object over a plurality of said video images; classifying said foreground object in said plurality of video images; and characterizing said activity of said foreground object based on comparison of said classifications to activity of a standard object; wherein said characterizing said activity includes: ... and analyzing temporal information selected from the group consisting of direction and magnitude of movement of the centroid, increase and decrease of the eccentricity, increase and decrease of the area, increase and decrease of the aspect ratio of the bounding box..." (See claim 14).

Therefore, in respect to above discussions, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teachings of claims 1-3, 5-7, 11, 14, 19 and 22 of '413 Patent as a general teachings for video-based

animal behavior analysis system to perform the same functions as claimed by the present application. The instant claims obviously encompass the claimed invention of '413 Patent and differ only in terminology.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Liang et al. (U.S. 6,678,413).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Re claim 1: Liang et al. disclose a video-based animal behavior analysis system, comprising: a computer configured to determine a position and shape of an animal from video images and characterize activity of said animal based on analysis of changes in said position and said shape over time (Claims 1 and 10, Col. 24 lines 59-64 and Col. 25 lines 50-51)

Re claim 2: Liang et al. disclose a video camera and a video digitization unit coupled to said computer for capturing said video images and converting said video images from analog to digital format (Claims 2 and 3, Col. 25 lines 10-17).

Re claim 3: Liang et al. disclose an animal identification, segregation, and tracking module receiving said video images (Claims 1 and 6, Col. 24 lines 65-67 and Col. 25 lines 27-33).

Re claim 4: Liang et al. disclose a behavior identification module for characterizing activity of said animal, said behavior identification module being coupled to said animal identification, segregation, and tracking module (Claim 5, Col. 25 lines 22-26).

Re claim 5: Liang et al. disclose a standard animal behavior storage module that stores information about known behavior of a predetermined standard animal for comparing the activity of said animal, said standard animal behavior storage

module being coupled to said behavior identification module (Claim 7, Col. 25 lines 34-41).

Re claim 6: Liang et al. disclose said animal is a mouse (Claim 11, Col. 25 line 52).

15. Claims 1, 2, 6-8 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawasaki et al. (JP 11-296651).

Re claim 1: Kawasaki et al. disclose a video-based animal behavior analysis (Paragraph [0001]) system, comprising: a computer (FIG. 1, "computer **5**") configured to determine a position and shape of an animal from video images and characterize activity of said animal based on analysis of changes in said shape over time (Paragraphs [0006} and [0007]).

Re claim 2: Kawasaki et al. disclose a video camera (FIG. 1, "video camera **1**") and a video digitization unit ("behavior observation system") coupled to said computer for capturing said vide images and converting said video images form digital to analog format ("digital images", Paragraphs [0005] and [0007]).

Re claims 6 and 7: Kawasaki et al. disclose said animal is a mouse and rat (FIG. 1, "rat **7**", Paragraph [0005]).

Re claim 8: Kawasaki et al. disclose a method of determining and characterizing activity of an animal using computer processing of video images (Paragraph [0001]), comprising the steps of: detecting an animal in said video images; tracking changes to said animal over a plurality of said video images (Paragraphs [0008] and [0009]); identifying and classifying said changes to said animal (Paragraph [0010]); and characterizing said activity of said animal based on comparison to pre-trained models or rules of such activity or based on calculation of behavioral parameters of behavioral processes and behavioral events (Paragraphs [0010] and [0011]).

Re claim 13: Kawasaki et al. disclose locating feature points and segments of said animal ("image parameters Paragraph [0007]); detecting behavior events by comparing animal feature against predefined rules ("behavior judgments" Paragraphs [0004], [0009] and [0010]); and detecting behavior parameters of behavioral processes (Paragraphs [0009] and [0010]).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. Claims 3, 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al. in view of Jiang, H. ("A Video Database System for Studying Animal Behavior"). The teachings of Kawasaki et al. have been discussed above. Kawasaki et al. teaches said computer further includes a standard animal behavior storage module that stores information about known behavior of a predetermined standard animal for comparing the activity of said animal, said standard animal behavior storage module being coupled to said behavior identification module ("behavior judgment", Paragraphs [0009] and [0010]).

However, Kawasaki et al. fails to disclose an animal identification, segregation, and tracking module receiving said video images and a behavior identification module for characterizing activity of said animal.

Jiang, H. teaches an animal identification, segregation, and tracking module receiving said video images (System Overview, "graphic user interface (GUI)", page 163 and Animal Tracking page 166) as recited in claim 3, and a behavior identification module for characterizing activity of said animal, said behavior identification module being coupled to said animal identification, segregation, and tracking module (Video Data Modeling pages 166-167) as recited in claim 4.

Therefore, in view of Jiang, H., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kawasaki et al.'s system by incorporating a graphic user interface to track multiple animal contours and deduct and summarize their behaviors in order to enhance the performance of the system creating an error and biased-free system.

18. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al. in view of Matsugu et al. (U.S. 6,757,444). The teachings of Kawasaki et al. have been discussed above.

However, Kawasaki et al. fails to disclose said detecting an animal includes using a background subtraction method comprising the steps of: apply a adaptive or constant threshold on the difference values between a current image and a background so as to determine a broad region of interest; post-process the various pixels in said region of interest to obtain said animal using various morphological and area refinement techniques; and refine contours of said animal image by smoothing.

Matsugu et al. teaches said detecting an animal includes using a background subtraction method comprising the steps of: apply an adaptive or constant threshold on the difference values between a current image and a background so as to determine a broad region of interest (Col. 21 lines 51-57 and lines 66-67 through Col. 22 lines 1-3)); post-process the various pixels in said region of interest to obtain said animal using various morphological and area refinement techniques (Col. 22 lines 34-42); and refine contours of said animal image by smoothing ("contour smoothing", Col. 22 lines 56-63).

Therefore in view of Matsugu et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kawasaki et al.'s method by incorporating a background subtraction method comprising the steps of: apply an adaptive or constant threshold on the difference values between a current image and a background so as to determine a broad region of interest; binarize the edge image using a threshold value distribution; and low-pass filter the contours of said

animal image by smoothing in order to make the subject extraction process easier and with a higher precision.

19. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al. in view of Crabtree et al (U.S. 6,295,367). The teachings of Kawasaki et al. have been discussed above.

However, Kawasaki et al. fails to disclose the step of identifying and classifying changes to said animal includes using statistical shape information selected from the group consisting of: area of the animal; centroid position of the animal; bounding box and its aspect ratio of the animal; eccentricity of the animal; and a directional orientation of the animal relative to an axis as generated with a Principal Component Analysis.

Crabtree et al. teaches the step of identifying and classifying changes to said animal includes using statistical shape information selected from the group consisting of ("Moment Features"): area of the animal; centroid position of the animal; bounding box and its aspect ratio of the animal; eccentricity of the animal; and a directional orientation of the animal relative to an axis as generated with a Principal Component Analysis (Col. 18 lines 64-67 and Col. 19 lines 1-11).

Therefore, in view of Crabtree et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kawasaki et al.'s method by incorporating the method step of identifying and classifying changes to said animal includes using the moment features (invariants, eccentricity, orientation, oriented bounding box,/aspect ratios) extracted during image segmentation in order to track the

movement of complex objects through a scene which can function on an inexpensive computation platform.

20. Claims 11, 12, 14-23, 25-28 and 31-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al in view of Brunner et al. (U.S. 2003/0100998). The teachings of Kawasaki et al. have been discussed above.

However, Kawasaki et al. fails to disclose said steps are also performed in night conditions by using red light to simulate such night conditions, or by using infra-red cameras to capture the images with no light and with a plurality of cages or arenas, each of which contains a single animal, detecting body parts of the animal, said body parts including the head, tail, waist, fore body and hind body, said video images include images captured of various animal behavioral analysis apparatuses and said tracking, identifying and characterizing activities is performed on those behavioral analysis apparatuses. Said various behavioral analysis apparatuses include a home cage, an open field, a Water Maze, a zero maze, an Elevated Plus maze, Object Recognition, and cued or conditioned fear chambers used for freezing. Said detection of behavioral events include turning ratio, sniffing at objects, stretch-and –attend, stay-across-areas, head dipping, the behavior of freezing, the behavior of locomoting, the behavior of transgressing from one zone to another, proximity score, heading errors and instant and average speed of movements, distance traveled and its instant and cumulative body turning angles.

Brunner et al. teaches said steps are also performed in night conditions by using red light to stimulate such night conditions, or by using infra-red cameras to capture the images with no light ("infrared sensor (IR)", Paragraph [0246]) as recited in claim 11, said steps are also performed with a plurality of cages or arenas, each of which contains a single animal (Paragraphs [0073] and [0280]) as recited in claim 12, detecting body parts of the animal ("Self-organizing map (SOM) that tracks the outline.", Paragraph [0276]) as recited in claim 14, said body parts include the head, tail, waist, fore body and hind body (Paragraph [0276]) as recited in claims 15-19, said video images include images captured of various animal behavioral analysis apparatuses ("cage") and said tracking, identifying and characterizing of activities is performed on those behavioral analysis apparatuses (Paragraph [0281]) as recited in claim 20, said various behavioral analysis apparatuses include home cage, a cage looking like a shoebox used for housing animals (FIG. 2, "cage 4", Paragraph [0244]) as recited in claim 21, said various animal behavioral analysis apparatuses include open field, in various shapes such as circular, square, or rectangular ("open environment", Paragraph [0243]) as recited in claim 22, said various animal behavioral analysis apparatuses include Water Maze, made of a circular pool filled with water and a hidden clear or white Plexiglas platform ("Morris water maze", Paragraph [0062]) as recited in claim 23, said various animal behavioral apparatuses include zero maze, made of brightly lit, open areas alternating with dark, covered areas, comprising the annulus of an elevated circular runway ("dark-light transition test", Paragraph [0062]) as recited in claim 25, said various animal behavioral apparatuses include Elevated Plus maze, comprising

four narrow runways, two well lit and open, and two alternating enclosed with walls and dark, and a center box where the animal is placed initially ("elevated plus maze", Paragraph [0062]) as recited in claim 26, said various animal behavioral analysis apparatuses include Object Recognition, where multiple objects of different shapes and colors are placed in an open field ("moving an object", Paragraph [0147]) as recited in claim 27, said various animal behavioral analysis apparatuses include cued or conditioned fear chambers used for freezing (Paragraph [0261]) as recited in claim 28.

Brunner et al. further teaches said detection of behavioral events includes turning ratio: ratio of path length traveled over number of turns, where number of turns is counted when the animal makes a turn larger than 90 degrees when the animal travels one body length ("Drug-Induced Turning", Paragraph [0271]) as recited in claim 31, sniffing at objects, an event counted when animal's nose is in contact with an object in a object recognition apparatus ("sniffing", Paragraph [0148]) as recited in claim 32, stretch-and-attend: Cautious approach with fore body stretched and lowered followed by the retraction of the fore body ("stretch-attend", Paragraph [0148]) as recited in claim 33, stay-across-areas: partial incursions into particular zones. For example, the animal might maintain its hind quarters in a closed arm while poking its nose into an open arm ("nose-poking", Paragraphs [0147] and [0148]) as recited in claim 34, head dipping, exploratory movement of head/shoulders over the side of the maze (Paragraph [0148]) as recited in claim 35, the behavior of freezing, and said freezing behavior is determined by the absence of movement of rodent body for a brief period of time ("Defensive Burying Test ... freezing", Paragraph [0147]) as recited in claim 36, the behavior of

locomoting, and said locomotion behavior is determined by the movement of the rodent around the cage or arena when viewed from the top ("circling", Paragraph [0148]) as recited in claim 37, the behavior of transgressing from one zone to another, and said transgression behavior is detected by the movement of a portion of, or the entire body of the rodent across from one defined zone or area into another defined zone or area ("Straight Alley", Paragraph [0271]) as recited in claim 38, said detection of behavior parameters of behavioral processes includes proximity score: calculated by determining the distance of the animal from the goal during each second of the trial and is used as a measure of deviation from the ideal path to the platform once an animal is placed in a water maze setting ("Straight Alley", Paragraph [0251]) as recited in claim 39, heading errors: defined as an instance of swimming away from the VISIBLE platform in a water maze setting ("Orientation, direction of turning", Paragraph [0251]) as recited in claim 40, and instant and average speed of movements ("velocity of the center of the animal", Paragraph [0301]), distance traveled ("Stride length"), its instant and cumulative body turning angles ("Drug-Induced Turning", Paragraph [0271]) as recited in claim 41.

Therefore, in view of Brunner et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kawasaki et al.'s method by incorporating the method steps of performing animal behavior analysis using infra red sensors and multiple cages or arenas, detecting body parts of the animal using a Self-Organizing Map, using different behavioral analysis apparatuses as a home cage, an open environment, a Morris water maze, a dark-light transition test, an elevated plus maze, moving an object and a cued or conditioned fear chamber, and

detecting the behavioral events of Drug-Induced Turning, sniffing, stretch-attend, nose-poking, head dipping, freezing, circling, transgressing from one zone to another, proximity score, Straight Alley, orientation, direction of turning, velocity of the animal, and stride length in order to facilitate and conduct as many experiments as possible during a single session, and collectively obtain a variety of behavioral, neurological, biochemical and/or physiological and physiological data from a test subject.

21. Claims 24, 29 and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasaki et al. in view of Brunner et al. as applied to claim 20 above, and further in view of Gondhalekar et al. (U.S. 2003/0024482). The teachings of Kawasaki et al. modified by Brunner et al. have been discussed above.

However, Kawasaki et al. modified by Brunner et al. fails to disclose said various animal behavioral analysis apparatuses include Y-maze (three-sided runway, where one arm can deliver electrical foot-shock through its floor grid), T-maze (Runways are in the shape of T; its sides are made of black Plexiglas or wood; its floor is metal mesh.), and Radial arm maze (comprised of 8 or 12 arms, radiating from a central start box, made of Plexiglas or wood), an unified framework, called "virtual apparatus", which uses a graphic tools to simulate various types of apparatuses, and "virtual zones", which are created with graphic tools provided in the system to simulate various types of dividing zones within the apparatuses.

Gondhalekar et al. teaches said various animal behavioral analysis apparatuses include Y-maze (three-sided runway, where one arm can deliver electrical foot-shock

through its floor grid), T-maze (Runways are in the shape of T; its sides are made of black Plexiglas or wood; its floor is metal mesh.), and Radial arm maze (comprised of 8 or 12 arms, radiating from a central start box, made of Plexiglas or wood) ("dynamic maze capable of various configurations" Paragraph [0021], "shock-providing mechanism", Paragraph [0027]) as recited in claim 24, an unified framework, called "virtual apparatus", which uses a graphic tools to simulate various types of apparatuses and "virtual zones", which are created with graphic tools provided in the system to simulate various types of dividing zones within the apparatuses ("integrated light source", Paragraph [0027]) as recited in claims 29 and 30.

Therefore, in view of Gondhalekar et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Kawasaki et al. as modified by Brunner et al. by including the various animal behavioral analysis apparatuses including a Y-maze, T-maze, Radial arm maze, "virtual apparatus" and "virtual zones" in order to allow the continuous collection of behavioral data concerning the test subject thereby providing a more efficient, user-independent, and cost-effective approach than traditional behavioral tests.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reid disclose a Method and Apparatus for Tracking a Moving Object, Ohl disclose a New Screening Tool for Analyzing Behavior of Laboratory Animals, Pugh disclose an Apparatus and Method for Animal Behavior Tracking,

Predicting and Signaling, Ainscow et al. disclose a Method and Apparatus for Capturing the Motion of an Object in Motion Video, and Kazuhito disclose an Observation Apparatus for the Behavioral Observation of Experimental Animals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose M. Torres whose telephone number is 571-270-1356. The examiner can normally be reached on Monday thru Friday: 8:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jong-Suk (James) Lee can be reached on 571-272-7044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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12/05/06

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